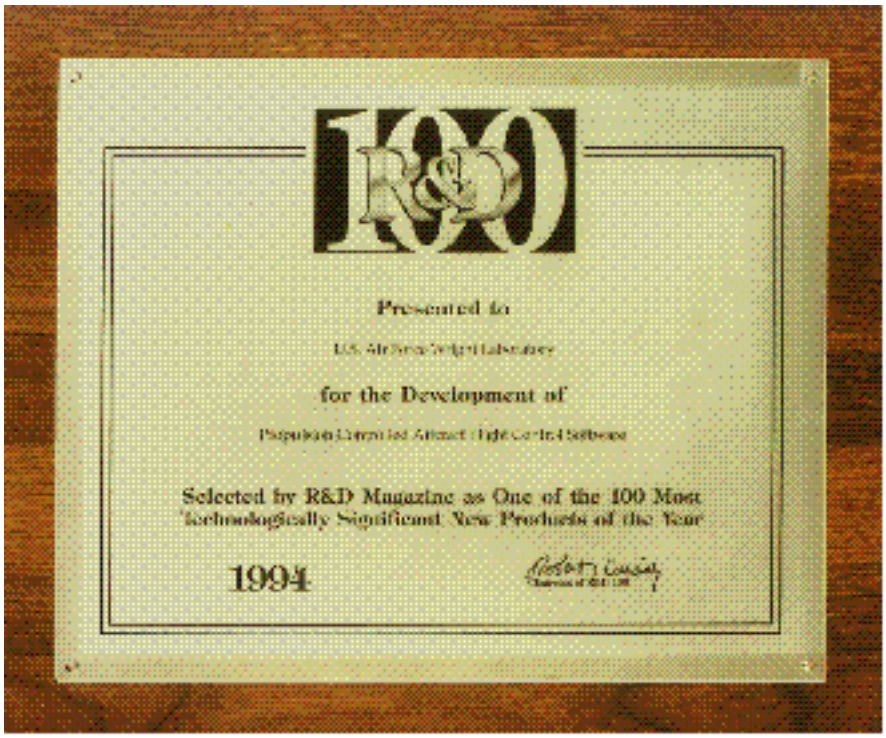
PROPULSION CONTROLLED AIRCRAFT TECHNOLOGY SELECTED FOR 1994 R&D 100 AWARD



Payoff

R&D Magazine identified the Propulsion Controlled Aircraft (PCA) Flight Control Software as one of the 100 most technologically significant technologies of the year. This technology, coupled with other current digital and sensor technologies, offers the potential to recover damaged or impaired military and civilian aircraft without the loss of life.

Accomplishment

The development of Propulsion Controlled Aircraft (PCA) Flight Control Software was recognized by R&D Magazine as one of the 100 most technologically significant products of 1993. The award given to Wright Laboratory was one of the prestigious R&D 100 Awards made in 1994. This PCA program, partially funded by Wright Laboratory and managed by NASA Dryden, used software developed by McDonnell Douglas. This computer program automated thrust augmentation functions to assist the pilot in successfully landing an impaired (all of its flight control surfaces

locked) F-15 aircraft at Edwards AFB CA using thrust only (no thrust vectoring) for control.

Background

Each year R&D Magazine recognizes the 100 most tech-nologically significant new products of the year. Called the "Oscars of Invention" and the "Nobel Prize of Applied Research," one of the 100 awards presented in September 1994 went to the Propulsion Controlled Aircraft Flight Control Software team members. They were recognized for their successful development and demonstration of an alternative approach to help pilots fly severely damaged aircraft to a safe landing. An extension of the joint Air Force/NASA Self-Repairing Flight Control System program, the PCA program received its impetus following the 19 July 1989 crash of a United Airlines DC-10 due to complete flight control surface lock. Preliminary attempts to control the aircraft through manual control of the throttle only, even when level and trimmed out, was determined to be very difficult but possible. The PCA team found that, lacking the precision required to land the aircraft due to a lightly damped Dutch roll, Phugoid mode oscillation and slow response of the engines to throttle changes, automatic thrust augmentation was required. A computer program, using normal aircraft sensors and displays, measures aircraft angle and rate information and couples it with pilot commands to provide the augmentation required to safely land the F-15 with its flight controls locked. The display shows the commanded flight path of the aircraft enabling the pilot to immediately know the effect of his commands, thereby precluding over or under control of the aircraft. This system allowed consistently safe landings in a piloted simulator leading to the actual safe landing of the F-15 in April 1993. Transition of this technology to transport and commercial aircraft is underway.